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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/531,023	TRUYEN ET AL.
	Examiner	Art Unit
	Mia M. Thomas	2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 2005-04-12

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to the applicant's remarks received on 12 April 2005. Claims 1-21 remain pending in this instant application. The amendments to the claims were made solely to avoid filing the claims in the multiple dependent forms so as to avoid the additional filing fee. Applicants have remarked that they reserve their right to reintroduce subject matter deleted herein at a later time in during the prosecution for this application or continuing applications. This amendment has been entered for instant application 10/531,023.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE

Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

4. Claims 9 and 20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 9 and 20 define a computer program embodying functional descriptive material. However, *the claim does not define a computer-readable medium or computer-readable memory and is thus non-statutory for that reason* (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests amending the claim(s) to embody the program on "computer-readable medium" or equivalent; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or

"transmission medium" which are deemed non-statutory (refer to "note" below). Any amendment to the claim should be commensurate with its corresponding disclosure.

Note:

A "signal" (or equivalent) embodying functional descriptive material is neither a process nor a product (i.e., a tangible "thing") and therefore does not fall within one of the four statutory classes of § 101. Rather, "signal" is a form of energy, in the absence of any physical structure or tangible material.

Should the full scope of the claim as properly read in light of the disclosure encompass non-statutory subject matter such as a "signal", the claim as a whole would be non-statutory. In the case where the specification defines the computer readable medium or memory as statutory tangible products such as a hard drive, ROM, RAM, etc, as well as a non-statutory entity such as a "signal", "carrier wave", or "transmission medium", the examiner suggests amending the claim to *include* the disclosed tangible computer readable media, while at the same time *excluding* the intangible media such as signals, carrier waves, etc.

Claim Suggestions

5. As observed by Examiner, it appears that applicant intended to also delete or strikethrough the phrase "in any one of the [claim 10]...". Examiner believes that applicant intended for the claim to read: A method as claimed in Claim 10, wherein the step of retrieving estimated parameters...

Examiner suggests that the change be made to delete the words "in any one of the" at page 7, claim 14, line 1.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Kimmel (US 6,031,935).

Regarding Claim 1: Kimmel discloses a method of constructing a model ("...it is an object of the present invention to provide a novel apparatus and method for segmenting images..." at column 2, line 51; "Producing at least one Training Contour")) of a composite structure for estimating parameters of the model (Refer to Figure 1, numeral 40-parameters=characteristics) with respect to an N-dimensional signal, N>2, in particular for segmenting a medical image ("...It is useful to extract a three-dimensional shape from a collection of two-dimensional cross-sections through the shape. For example, in brain scans, a CAT scanner produces a series of two-

dimensional images. Currently, the only reliable way to construct the three-dimensional

image is through tiresome and expensive manual (human) segmentation of each slice. The present inventive method is well suited to automating this problem. This is especially useful to those in pharmaceutical, biochemical, and neurobiological fields, who often deal with animal organs, such as rat and cat brains." at column 3, line 66); the method including:

constructing a plurality of constituent models, each constituent model corresponding to a respective predetermined constituent structure and being designated for estimating parameters of the constituent model with respect to the N-dimensional signal based on respective prior knowledge of the constituent structure, at least two of the constituent models being based on differing technologies (Refer to Figure 1, numeral 20 and numeral 40);

and each constituent model being provided with a uniform, predetermined interface for controlling the constituent model and for retrieving parameters estimated by the constituent model (Refer to Figure 18a; "The present method is implemented in a known digital computer, and preferably uses a standard WINDOWS™ interface to demonstrate the functions described herein." at column 41, line 7);

and constructing the model by determining at least two constituent structures that are incorporated in or related to the composite structure and forming the composite model based on respective constituent models that correspond to the respective determined constituent structures (Refer to Figure 1, numeral 30; "...b) providing a priori domain knowledge corresponding to the set of search images; c) selecting one or more search images to act as training images; d) obtaining a training contour from

each training image, the training contour representing an outline of the target object in the corresponding training image..." at column 5, line 14);

the model being operative to control the constituent models, to retrieve estimated parameters from the constituent models and to estimate parameters of the model in dependence on the retrieved parameters ("...(e) utilizing each training contour to extract training information regarding the target object in the corresponding training image; f) associating a selected training contour with a selected search image of the set of images, the training contour defining a search contour; g) deforming the search contour relative to the selected search image and maintaining predetermined information corresponding to the deformed search contour; h) utilizing the training information and the a priori domain knowledge to identify regions of the deformed search contour that correspond within predetermined limits to an outline of the target object in the selected search image..." at column 5, line 19).

Regarding Claim 2: Kimmel discloses wherein the constituent model is a primitive model ("Specifically, one embodiment of the present inventive method includes the steps of a) providing a set of search images..."at column 5, line 11) corresponding to a respective predetermined primitive structure in the N-dimensional signal (...each search image containing a view of a target object..." at column 5, line 13) and being designated for estimating the model parameters solely based on prior knowledge of the primitive structure without using further models for estimating parameters of the model with respect to the signal ("...(b) providing a priori domain knowledge corresponding to the set of search images; c) selecting one or more search images to act as training images; d) obtaining a training contour from each training image, the

training contour representing an outline of the target object in the corresponding training image..." at column 5, line 14).

Regarding Claim 3: Kimmel discloses wherein the constituent model is a composite model ("The "target object" is a single object that appears in all of the images, but may appear from different views or angles, or may change in some way from image to image." at column 7, line 10)

corresponding to a further composite structure for estimating parameters of the composite model with respect to the N-dimensional signal ("For example, if the target object is the left ventricle, then different slices of the left ventricle appear in all of the images over space or time, reflecting both the different data sets acquired during each image acquisition, and the motion of the ventricle over time and space." at column 7, line 13)

by determining at least two of the constituent structures that are incorporated in or related to the further composite structure ("For example, in an image set containing a series of one-hundred images of the heart, the left ventricle may be the target object or object of interest in each of the images. The images may have been produced by imaging a "beating" heart in real time over a relatively short period of time. Thus, the series of one-hundred images may depict the heart as it moves through an entire pumping cycle." at column 7, line 24)

and forming the composite model based on respective constituent models that correspond to the respective determined constituent structures (Refer to Figure 1, numeral 100);

the composite model being operative to control the constituent models (Refer to Figure 1, numeral 90; "The contour is deformed to Lock on Regions which a priori and training information indicates..."the constituent model", further the Locked-on Regions are used to shape a final segmentation contour"), to retrieve estimated parameters from the constituent models (With respect to Figure 3; "This representation is very compressed, and easily readable by a human. Therefore, it is useful for saving and retrieving contours to or from computer storage, such as disk-drive storage, and for viewing by humans." at column 12, line 6)

and to estimate parameters of the composite model in dependence on the retrieved parameters.

Regarding Claim 4: Kimmel discloses wherein the constituent model is a spring model for modeling a relative position of at least two constituent models of the model with respect to each other (Refer to Figure 1, numeral 60; "Next, as shown in step 60, a nearest-neighbor training image (relative to the search image) is selected by the present inventive method. If only one training image exists, then it is selected. If multiple training images are available, then the one that lies closest to the search image in time or space is selected." at column 8, line 39).

Regarding Claim 5: Kimmel discloses wherein the spring model is operative to represent at least one of the following: distance between the at least two constituent models; angle between the at least two constituent models; relative scale between the at least two constituent models ("Referring now to FIG. 7, given a contour as defined, useful geometric information is attached thereto. The present inventive method keeps

track of the length of the contour, the area of the contour, the sum of the x coordinates of all the cracks or sum(X), the sum of the y coordinates of all the cracks or sum(Y), the centroid (center of gravity), and the sum of the distances (radii) from the centroid to each crack or sum(Radii)." at column 13, line 34).

Regarding Claim 6: Kimmel discloses wherein the interface enables setting at least one of the following parameters of a corresponding model: position of the model, scale of the model, orientation of the model (Referring to Figure 1, numeral 70, additionally: (Intuitively, one would gather that in the grand scheme of outputting information of a corresponding model we are associating the interface with that as similar to Figure 18a or Figure 18b...The training contour is produced in either step 40 or step 106, and as mentioned above, is assumed to provide an accurate outline of the target object in the training image. The training information, which includes the calculation of geometric parameters, <u>such as area,</u> and pixel intensity ("histogram") parameters, is explained in greater detail hereinafter." at column 8, line 54. Greater detail can be exemplified at column 18, lines 21-43).

Regarding Claim 7: Kimmel discloses wherein the interface enables instructing a corresponding model to perform at least one of the following operations: optimizing a fit of the model to the signal, calculating a measure of fitting of the model to the signal, determining a boundary of the model in the signal (Intuitively, one would gather that in the grand scheme of outputting information of a corresponding model we are associating the interface with that as similar to Figure 18a or Figure 18b...As shown at Figure 1, numeral 70, "...information about the target object, as it appears in the

training image, is extracted by analyzing the training contour that is associated with the training image...Desirable target objects for these image sets may include, respectively: a) the left ventricle of the heart... Note that the images of the image set may have undergone processing using standard image-processing techniques, such as filtering, smoothing, and morphological operations (erosion, dilation, etc). In general, any image processing that makes the target object more easily recognizable to a human, or that makes the target object more readily distinguishable from its surroundings will also make the target object more easily recognizable to the present inventive method. For example, image processing may be used to remove noise." At column 8, line 51, column 10, line 47 and column 10, line 56, respectively. For clarity, Examiner is interpreting "removal of noise" as "optimization of a fit of the model to the signal".

Regarding Claim 8: Kimmel discloses wherein the interface enables obtaining at least one of the following output information of a corresponding model: position of the model, scale of the model, orientation of the model, a measure of fitting of the model, a boundary of the model (Intuitively, one would gather that in the grand scheme of outputting information of a corresponding model we are associating the interface with that as similar to Figure 18a or Figure 18b..."One goal of the present inventive method is to find, and to "segment" a particular target object, as shown in each image of the set or series of images. For example, in an image set containing a series of one-hundred images of the heart, the left ventricle may be the target object or object of interest in each of the images. The images may have been produced by imaging a "beating" heart in real time over a relatively short period of time. Thus, the series of

one-hundred images may depict the heart as it moves through an entire pumping cycle." at column 7, line 22); For clarity, by way of example, "as it moves through" is the position and/or orientation of the model).

Regarding Claim 9: Kimmel discloses a computer program product for causing a processor to perform the method of claim 1 (Refer to Figure 18b. "The above-described method may be implemented, for example, on a personal computer, such as a dual 200MHz Pentium-Pro processor (Intel Corp.) computer manufactured by Micron Inc. The present method is implemented in a known digital computer, and preferably uses a standard WINDOWS™-Microsoft." at column 41, line 1).

8. Claims 10-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Bergman et al. (US 6,446,060 B1).

Regarding Claim 10: Bergmann discloses a method of estimating parameters of a model of a composite structure (Refer to Figure 1, numeral 103) with respect to an N-dimensional signal, N>2, in particular for segmenting a medical image ("These scenarios frequently arise in the following applications:... Medical image diagnosis: for retrieval of all MRI images of brains that have tumors located within the hypothalamus, which tumors are characterized by shape and texture, and the hypothalamus is characterized by shape and spatial location within the brain..." at column 2, line 4); the method including: using a composite model of the composite structure that is based on a plurality of constituent models that each correspond to a respective predetermined constituent structure in the N-dimensional signal and that

are incorporated in or related to the composite structure (Refer to Figures 2a and 2b; Further at column 6, lines 19-26 go on to discuss the composite object and the plurality of constituent models...);

each constituent model being designated for estimating parameters of the constituent model with respect to the N-dimensional signal (Referring to Figures 2a and 2b; "In general, composite objects may be nested within other composite objects." at column 6, line 14, as best understood as exemplified at Figure 21, numeral 211 suggests a parameter estimate for numeral 204 "Woods")

based on respective prior knowledge of the constituent structure (This prior knowledge is retrieved from Figure 1, numeral 104 working with numeral 103), at least two of the constituent models being based on differing technologies (Referring to Figure 2a, numeral 202 corresponds to shape; numeral 204 corresponds to texture);

and each constituent model being provided with a uniform, predetermined interface for controlling the constituent model and for retrieving parameters estimated by the constituent model (Refer to Figure 9, numeral 901; " The bound-is-best assumption is modified to include, bound-is-best, then fuzzy, then free. That is, sub-goals with bounded variables are moved to the front of the program, followed by those with fuzzy variables, then those with free. This process is summarized in FIG. 11..." at column 10, line 30); controlling the constituent models to estimate parameters of the constituent model ("... 1. Order the sub-goals according to the following order (1101) bound is best, fuzzy, and free. 2. Determine the argument binding (1102), 3. Minimize the number of unconstrained lookup (1103)..." at column 10, line 35);

retrieving estimated parameters from the constituent models (Refer to Figure 13, numeral 1302); and estimating parameters of the model in dependence on the

retrieved parameters (For example, for models that have a "fuzzy connection", the dependence on the retrieved parameters is best described at Figure 14, numeral 1407).

Regarding Claim11: Bergman discloses wherein the constituent model is a primitive model (Refer to Figures 3 and 4 to example how "K" simple objects are the primitive models of the now constituent models "L" target images) corresponding to a respective predetermined primitive structure in the N-dimensional signal and being designated for estimating the model parameters solely based on prior knowledge of the primitive structure without using further models for estimating parameters of the model with respect to the signal (Since the content-based components of the query involves the assessment of spatial, temporal and feature similarities, the system builds and maintains an overall similarity score between each candidate composite retrieved from the database and the query composite object. The inventive system selects the candidate composite objects for evaluation in a best-first search." at column 3, line 51).

Regarding Claim12: Bergman discloses wherein the constituent model is a composite model corresponding to a further composite structure for estimating parameters of the composite model with respect to the N-dimensional signal ("Composite objects are defined by the composition of K simple objects. The composition involves spatial, temporal and fuzzy relationships between simple objects. In general, composite objects may be nested within other composite objects." at column 6, line 14) by determining at least two of the constituent structures that are incorporated in or

related to the further composite structure and forming the composite model based on respective constituent models that correspond to the respective determined constituent structures ("Several feature attributes are stored for each object such as color, texture, shape and motion." at column 6, line 10);

the composite model being operative to control the constituent models, to retrieve estimated parameters from the constituent models and to estimate parameters of the composite model in dependence on the retrieved parameters ("Refer to Figure 9, numeral 902; "Query block management (902): wherein, for each sub-goal, processes are designated for retrieving blocks of the best L matches, second-best L matches, and so forth, and caching the results; followed by selecting combinations of blocks to be processed by the algorithm." at column 9, line 56).

Regarding Claim13: Bergman discloses wherein the constituent model is a spring model for modeling a relative position of at least two constituent models of the composite model with respect to each other ("A composite object query is formed by giving a set of simple objects and the attributes and relationships of interest between them. The attributes and relationships (e.g., the spatial relationships of FIG. 6) are given in the form of sub-goals. Each of the sub-goals is evaluated by the rules of the system." at column 6, line 39).

Regarding Claim 14: Bergman discloses wherein the step of retrieving estimated parameters from the constituent models includes retrieving a measure of fitting of each constituent model; (Referring to Figure 6 and 7; "...the composite object query involves only a subset of the attributes and relationships in the candidate composite

objects. Each candidate composite object is assessed by measuring its similarity to the query composite object." at column 6, line 54) and wherein the step of estimating parameters of the model includes calculating a measure of fitting of the model in dependence on the retrieved measures of fitting of the constituent models and on a contribution of the composite model ("This overall similarity is determined by the similarities in the attributes and relationships of simple objects between the query and candidate composite objects. These similarities are determined by evaluating sub-goals according to spatial and temporal rules, content-based rules, and the fuzzy conjunctions between them (detailed further below)." at column 6, line 58)

Regarding Claim 15: Bergman discloses wherein each constituent model of the composite model is operative to adjust a fitting to the signal in response to an instruction via its interface ("In this table, IMAGEID uniquely identifies each image, and OBID uniquely identifies each simple object in each image." For clarity, spatial, temporal, feature, semantic and relational data are stored in this database.); the method including optimizing a fitting of the model to the signal by instructing each constituent model to adjust its fitting to the signal ("There are several techniques for optimizing the evaluation of a set of logical sub-goals involving free and bounded variables. One technique, called "bound-is-best," involves the reordering of the sub-goals to give the sub-goals with bounded variables priority over those with free variables." at column 7, line 33).

Regarding Claim 16: Bergman discloses wherein the step of instructing each constituent model to adjust its fitting includes selecting a first one of the constituents

models; instructing the first constituent model to optimize its fitting (Refer to Figure 10-"Sub-Goals of the Query"); and sequentially instruct other ones of the constituent models to optimize their fitting with respect to the already optimally fitted constituent model(s) (Refer to Figure 12-Sub Goals 1-8 as listed to the).

Regarding Claim 17: Bergman discloses wherein the step of optimizing a fitting of the model to the signal includes (Refer to Figure 14): adjusting a position, orientation and/or scale of the composite model (Refer to Figure 14, numeral 1401); and for each of the constituent models: determine derivative adjustments in a position, orientation and/or scale of the constituent model (Refer to Figure 14, numeral 1402); instructing the constituent model to perform the adjustment (Refer to Figure 14, numeral 1405); and retrieve a measure of fitting of the constituent model (Refer to Figure 14, numeral 1406); and calculating a measure of fitting of the model (Refer to Figure 14, numeral 1407).

Regarding Claim 18: Bergman discloses wherein the step of optimizing a fitting of the model to the signal includes: for each constituent model (Refer to Figure 15, numeral 1502): instructing the constituent model to optimally adjust a position, orientation and/or scale of the constituent model; and retrieving position, orientation, and/or scale information from the constituent model; and determining position, orientation, scale and/or deformation of the model from the retrieved information; and calculating a measure of fitting of the model (Refer to Figure 15; "FIG. 15 shows the general algorithm for organizing query blocks into a tree hierarchy (1501). The first step is to map each sub-goal into a query block processing stage (1502). At each stage, the

query blocks are generated for each sub-goal (using the algorithm outlined in FIG. 14) (1503)." at column 11, line 23. For clarity, Examiner is suggesting that each "constituent model" is a "sub-goal").

Regarding Claim 19: Bergman discloses the step of optimizing a fitting of the model to the signal includes: for each constituent model: instructing the constituent model to optimize its fitting to the signal ("A query block is defined as follows: given a sub-goal, i.e., COLOR (A, B), the sub-goal is evaluated and results are returned in blocks as follows: the first best L, the second best L, the third best L, and so forth. For each sub-goal, the results are cached temporarily for use by the algorithm." at column 11, line 7); and retrieving position, orientation, scale and/or deformation information from the constituent model ("The algorithm for retrieving results of each sub-goal in blocks and decomposing joins to operate on blocks is shown in FIG. 14." at column 11, line 11and at Figure 19 for example.); and determining position, orientation, scale and/or deformation of the model from the retrieved information; and calculating a measure of fitting of the model ((Referring to Theorem 1 at column 12, line 15)..."The above theorem is generalized to more than two ranked lists. In this case, an M exists such that the K best combinations extracted from the top M candidates from each list is the same as the K best combinations extracted from the entire list. In the following, a sequential processing algorithm is developed for the fuzzy(AND) definition in Equation. 4. This algorithm retrieves the best K combinations for a composite object consisting of O simple objects, where O≥2. The significance of this theorem is that only the top K candidates need to be evaluated for each component in the query without having to worry about the possibility of false dismissal." at column 12, line 27).

Regarding Claim 20: Bergman discloses a computer program product for causing a processor to perform the method of claim 10 (Refer to Claim 13; "A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for providing computer retrieval of images of composite objects..." at column 15, line 54-column 16, lines 1-14).

Regarding Claim 21: Bergman discloses an apparatus for estimating parameters of a model of a composite structure (Refer to Claim 12 at column 15, line 41) with respect to an N-dimensional signal, N>2, in particular for segmenting a medical image ("These scenarios frequently arise in the following applications:... Medical image diagnosis: for retrieval of all MRI images of brains that have tumors located within the hypothalamus, which tumors are characterized by shape and texture, and the hypothalamus is characterized by shape and spatial location within the brain..." at column 2, line 4); the apparatus including:

an input for receiving the N-dimensional signal ("...comprising the steps of: a. receiving an input query..." at column 14, line 42)

a storage (Refer to Figure 1, numeral 105-"Direct Access Storage Devices") for storing a composite model of the composite structure that is based on a plurality of constituent models that each correspond to a respective predetermined constituent structure in the N-dimensional signal and that are incorporated in or related to the composite structure; each constituent model being designated for estimating parameters of the constituent model with respect to the N-dimensional signal based on respective prior knowledge of the constituent structure, at least two of the constituent models being

based on differing technologies ("...at least one storage medium for storing said images indexed according to one or more of said plurality of features..." at column 15, line 43; "Several feature attributes are stored for each object such as color, texture, shape and motion." at column 6, line 10);

and each constituent model being provided with a uniform, predetermined interface for controlling the constituent model and for retrieving parameters estimated by the constituent model (Refer to Figure 2b);

a processing system for estimating the parameters by: controlling the constituent models of the composite model to estimate parameters of the constituent model; retrieving estimated parameters from the constituent models; and estimating parameters of the model in dependence on the retrieved parameters; and an output for outputting the estimated parameters ("There exists a wide range of tradeoffs between the storage space and the processing time in order to execute the composite objects queries. The system, in general, builds various indexes of simple objects, simple object features and composite objects, which support the evaluation of the content-based composite object queries. Below are discussed three examples, which demonstrate the extremes in storage and processing requirements: the indexing of simple objects, the indexing of all pair-wise combinations of simple objects, and the indexing of all combinations of K simple objects (Additionally, consider column 8, lines 56-67 and column 9, lines 44 for those examples)" at column 8, line 45).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mia M. Thomas whose telephone number is 571-270-1583. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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